

IN THE CLAIMS

What is claimed is:

- 1 1. A method of forming contact holes, comprising the steps of:
  - 2 forming a first insulating film;
  - 3 forming a hole through the first insulating film;
  - 4 depositing a titanium layer in an essentially anisotropic manner;
  - 5 forming a titanium nitride film;
  - 6 forming a tungsten film;
  - 7 etching a tungsten film; and
  - 8 etching the titanium and tungsten films.

- 1 2. The method of claim 1, wherein:
  - 2 depositing a titanium layer in an essentially anisotropic manner
  - 3 includes depositing titanium according to method selected from the group
  - 4 consisting of an ion metal plasma method, a collimate sputtering method, and
  - 5 a long throw sputtering method.

- 1 3. The method of claim 1, wherein:
  - 2 forming a contact hole includes forming a contact hole having a width
  - 3 no greater than 0.25  $\mu$ m.

1    4.    A method, comprising the steps of:  
2                    anisotropically depositing a first conductive layer over a first  
3                    insulating layer having a contact structure hole formed therein; and  
4                    forming a conductive filling layer over the first conductive layer,  
5                    including within the contact structure hole.

1    5.    The method of claim 4, wherein:  
2                    depositing the first conductive layer includes an ion metal plasma  
3                    physical deposition method.

1    6.    The method of claim 5, wherein:  
2                    the ion metal plasma method of deposition includes applying an RF  
3                    power in the range of about 2.0 to 3.5 kilowatts to a chamber coil.

1    7.    The method of claim 5, wherein:  
2                    the ion metal plasma method of deposition includes applying a DC  
3                    power in the range of 2.0 to 3.0 kilowatts to a target that includes a first  
4                    conductive layer material.

1    8.    The method of claim 4, wherein:  
2                    depositing a first conductive layer includes a collimate sputtering  
3                    method.

1    9.    The method of claim 8, wherein:

2                the collimate sputtering method includes moving sputtering particles  
3                through a collimator having an aspect ration of about 2.

1    10.    The method of claim 8, wherein:

2                the collimate sputtering method includes applying a DC power in the  
3                range of 1.0 to 2.0 kilowatts to a target that includes a first conductive layer  
4                material.

PCT/US2016/038297

1    11.    The method of claim 4, wherein:

2                depositing a first conductive layer includes a long throw sputtering  
3                method.

1    12.    The method of claim 11, wherein:

2                the long throw sputtering method includes sputtering in sputtering  
3                chamber at a pressure no more than 1.0 mTorr.

1    13.    The method of claim 4, wherein:

2                the first conductive layer comprises titanium.

1    14.    The method of claim 4, wherein:

2                forming the conductive filling layer includes depositing tungsten with  
3                a chemical vapor deposition method.

1    **15.**    The method of claim 4, further including:  
2                    etching the conductive filling layer to expose the first conductive  
3                    layer.

1    **16.**    The method of claim 15, further including:  
2                    etching the first conductive layer to expose the first insulating layer  
3                    and forming a plug from the conductive filling layer.

1    **17.**    A method of forming a contact structure, comprising the steps of:  
2                    forming a first conducting layer over an insulating layer having a  
3                    contact hole formed therein, the first conducting layer having a first thickness  
4                    outside the contact hole that is greater than a second thickness on side surfaces  
5                    of the contact hole; and  
6                    forming a conductive filling layer over the first conducting layer  
7                    including within the contact hole.

1    **18.**    The method of claim 17, wherein:  
2                    the first conducting layer comprises titanium and the first thickness is  
3                    at least 100 nm.

1    **19.**    The method of claim 17, further including:  
2                    forming a second conducting layer over the first conducting layer prior

3 to forming the conducting filling layer.

1 **20.** The method of claim 17, further including:

2 etching the conducting filling layer with an etch having a selectivity

3 between the conducting filling layer and the first conducting layer; and

4 etching the first conducting layer with an etch having a selectivity

5 between the first conducting layer and the conducting filling layer.

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